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EXAMINER

CANTELMO, GREGG

ART UNIT PAPER NUMBER

1745

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/484,421

Applicant(s)

DUBS ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 35-43 and 45-60 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 35-43 and 45-60 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Response to Amendment

1. in response to the amendment received July 30, 2003:
 - a. Claims 1-34 and 44 have been cancelled. 17-43 and 45-60 are pending.
 - b. The prior art rejections of DE '592 and JP '568 as respective primary references stand;
 - c. The prior art rejections to Yamanishi as the primary reference are withdrawn.

Drawings

2. The drawings received August 13, 2003 are acceptable for examination purposes.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 35-43, 45-57 and 60 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application

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was filed, had possession of the claimed invention. Claim 35 recites that the substrate carrier receiving surface has a diameter of at least 160 mm. The specification only has support for the diameter dimension with respect to the substrate and not to the substrate carrier surface (see page 12 of the specification). For purposes of prior art rejections, this limitation has been interpreted, in light of the specification, to be the diameter of the substrate itself and not the diameter of the substrate carrier receiving surface.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 45, 53-55 and 58-59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 45 is out of the scope of independent claim 35. Amended claim 35 is limited to a single sputtering source. Claim 45 recites the chamber comprises two sputtering sources. The invention of claim 35 is to a single sputtering source arrangement as applicant has amended in the attempt of overcoming the primary rejections of Yamanishi (see arguments in the amendment), thus claim 45 is beyond the scope of claim 35 and indefinite;

b. Claims 53-55 are out of the scope of independent claims 35. Amended claim 35 recites that the substrate surface is 160 mm or greater. Claims 53-55 recite lower limit substrate diameters which are significantly below this lower limit

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(such as 50 mm and 64 mm). Thus the scope of claims 53-55 do not agree with claim 35 and these limitations are indefinite.

d. Claim 58 recites the limitation "said workpiece" in line 4. There is insufficient antecedent basis for this limitation in the claim. The term should be substrate. This applies to dependent claim 59 as well.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 35, 37, 42, 43, 53-55, 57 and 60 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by DE 41 04 592 A1 (DE '592).

See page 6 of the previous office action for the marked-up copy of Fig. 1, incorporated herein.

Fig. 1 discloses a sputtering chamber 3 comprising at least one sputtering source 6 with a new sputter surface 10 at least approximately symmetrical with respect to a first axis (Tx) (see marked-up copy in the previous office action), the axis being perpendicular to the sputter surface 10, substrate carrier 3 which is arranged to be driveably rotatable about a second axis (Sx), wherein the first and second axes are oblique with respect to one another and said sputtering source is a magnetron sputtering source with a magnetron magnetic field looping around the first axis with

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symmetric field polarity as viewed in a cutting plane through the new sputter surface 10 and containing the first axis, the substrate has an inherent diameter (as applied to claim 35).

With respect to the limitation of the substrate diameter: note that the claimed invention is drawn to a sputtering apparatus. The additional limitation to the substrate (substrate diameter) defines the article worked upon in the apparatus. See MEPE § 2115, incorporated herein (as applied to claims 35 and 53-55).

The first and second axes are virtual and infinite along the plane which defines each respective axis. Since the axes are oblique, they will intersect at some point (red X in marked up Fig. 1 above as applied to claim 37).

The first and second axes have a smallest mutual spacing situated on a surface of workpiece 18 (as applied to claim 42).

The substrate carrier 13 is located within chamber 3 at least approximately horizontally (HP in marked up Fig. 1 above as applied to claim 43).

The substrate carrier surface and new sputter surface bound a process space as shown in Fig. 1 (yellow highlight as applied to claim 57).

The relative size of the magnetron 6 in Fig. 1 is smaller than both the substrate 4 and substrate carrier 5 (as applied to claim 60).

Response to Arguments

9. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

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Applicant argues that DE '592 does not teach or suggest the extent of the substrate. This statement is not entirely true. Numerous references are made to the substrate (substrat), for example the material of the substrate (col. 3, ll. 20-25). It is conceded that there is no explicit teaching of the diameter of the substrate.

However as discussed above, no patentable weight has been accorded to the substrate since it is not a critical feature to the claimed invention, a sputtering chamber. It has been established that limitations to an article worked upon does not further define the chamber or apparatus wherein the article is processed. Therefore this limitation has no bearing on the patentability of the sputtering chamber.

Weight has been accorded to this limitation with respect to the process as is evident by the withdrawal of claim 58 from this rejection.

Applicant additionally argues that the lines 11 are the plasma lines. Plasma is directly influenced by the magnetic field generated by the magnetron array. DE '592 uses an RF magnetron sputtering array. Thus the lines of the plasma as shown in Fig. 1 are shaped by corresponding magnetic field lines generated by the magnetron. Thus plasma lines 11 in Fig. 1 are also held to be representative of the magnetic field lines which shapes the plasma in the chamber accordingly. One of ordinary skill in the art, even in the absence of an explicit teaching in DE '592 of the magnetic field lines, would have understood that the plasma lines shown in the figure are also representative of the magnetic field lines.

For these reasons, it is held that DE '592 still anticipates the claimed invention as set forth above.

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Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over DE '592 in view of either Tateshi or Moslehi.

The teachings of DE '592 have been discussed above and are incorporated herein.

The difference not yet discussed is of moving the substrate linearly in a direction parallel to the substrate carrier axis (claim 56).

Tateshi discloses a magnetron sputtering apparatus wherein the substrate support moves laterally. The lateral movement means allows for positioning a substrate such that it can be transferred to and from the processing chamber while also providing close target to substrate processing during deposition (see Fig. 7). It is well known in the art to position a gate for introducing the substrate to the processing chamber, near the bottom of the chamber and thereafter raise the substrate and substrate platen to an upper position closer to the target.

Additionally use of an actuator to move the substrate in a vertical position

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to achieve a predetermined deposition distance between the substrate and the tantalum target in order to establish the optimal deposition uniformity and material properties (Moslehi, col. 11 lines 29-35).

The motivation for providing means for moving the substrate carrier in this fashion is to raise the substrate from a substrate chamber insertion position to a wafer film deposition position. It is also known that providing means to move the substrate vertically relative to the deposition source to establish optimal deposition uniformity and material properties.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of DE '592 by moving the substrate carrier in this fashion since it would provided means for a wafer inserted at the base of the chamber sidewall to be moved in close proximity to the target and further such movement would have optimized deposition uniformity and material properties of the thin film.

Response to Arguments

12. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

See arguments in item 9 above, incorporated herein. Applicant does not appear to present further arguments to the 103 rejections set forth above apart from those arguments discussed in item 9 above.

Claim Rejections - 35 USC § 103

13. Claims 38-41 rejected under 35 U.S.C. 103(a) as being unpatentable over DE '592 in view of Yamanishi.

The teachings of DE '592 have been discussed above and are incorporated herein.

The differences not yet discussed are of setting the angle of the magnetron relative to the substrate carrier surface to be within the ranges set forth in claims 38-41.

DE '592 does teach of positioning the magnetron at an angle to the substrate carrier surface (Fig. 1). The angle can be set to a value within the range from 0° to 90° (see col. 3, ll. 1-5).

The preferred angle of the invention of Yamanishi is between 30° and 60° (col. 3, ll. 21-25) to provide uniform thickness of the film on the substrate (col. 8, ll. 25-28 as applied to claims 38-41). And by one example the actual angle is 45° (col. 7, ll. 17-24). Thus it would have been expected that the same range be applied in the prior art, which shows identical positional relationship.

The motivation for positioning the magnetrons relative to the substrate within the range of 30° to 60° is to provide uniform thickness of the film on the substrate.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of the DE '592 by positioning the magnetrons at an angle from 30° to 60° relative to the substrate carrier since it would have provided uniform thickness of the film on the substrate.

Response to Arguments

14. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

See arguments in item 9 above, incorporated herein. Arguments drawn to Yamanishi are set forth in Applicant's response, but is a piecemeal analysis of the prior art and there are no arguments to the combination of DE '592 in view of Yamanishi. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Claim Rejections - 35 USC § 103

15. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE '592 in view of JP 10-121237-A (JP '237).

The teachings of claim 35, with respect to DE '592 have been discussed above and are incorporated herein.

The differences not yet discussed are of the size relationship between the target and substrate (claims 51 and 52).

JP '237 discloses of a target to substrate arrangement wherein the target size relative to the substrate size is slightly larger. Thus the ratio of the target sputtering surface to the substrate surface is at least 1.

The motivation for providing a target diameter which is slightly larger than the substrate diameter is that it ensures full coverage of the substrate during deposition.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of DE '592 by selecting the target diameter to be slightly larger than the substrate diameter since it would have ensured full coverage of the substrate during deposition.

Response to Arguments

16. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

17. Claims 35-43, 46-50 and 53-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2 141 568 A (JP '568) in view of Yamanishi.

See page 15 of the previous office action for the marked-up copy of Fig. 1, incorporated herein.

Fig. 1 discloses a sputtering system comprising an inherent sputtering chamber, at least one sputtering source 1 with a new sputter surface at least approximately symmetrical with respect to a first axis (Tx, see marked-up drawing in the previous office action), the axis being perpendicular to the sputter surface, substrate carrier 4 which is arranged about a second axis (Ts, see marked-up drawing in the previous office action), wherein the first and second axes are oblique with respect to one another

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and said sputtering source is a magnetron sputtering source with at least one closed-loop, tunnel-shaped magnetic field pattern around said first axis with constant field polarity as viewed in a direction along said closed loop. The field lines drawn in the marked up drawing below by Examiner on the basis that such field lines are inherent due to the configuration of the permanent magnet polarities and evident from the erosion profile 3 in the target surface (as applied to claim 35).

With respect to the limitation of the substrate diameter: note that the claimed invention is drawn to a sputtering apparatus. The additional limitation to the substrate defines the article worked upon in the apparatus. See MEPE § 2115, incorporated herein (as applied to claims 35 and 53-55).

The target is rotationally symmetrical about its axis (as applied to claim 36).

When angled as taught by JP '568, the first and second axes, being oblique and infinite will intersect at least approximately (red X in the marked-up drawing as applied to claim 37).

The angle minimum is 60° (abstract as applied to claim 38).

With respect to the angle between the first and second axis as defined in claims 39-41:

While JP '568 discloses that the range is from 60-90° (abstract), the manner in which the prior art apparatus of Fig. 1 is configured is such that the substrate holder can be rotated to any angular position (denoted by the arrow of rotation of the holder 4). Therefore while the *process* of JP '568 uses a set angle, the apparatus is structurally capable of providing any angular position.

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While intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). As applied to claims 39-41.

The first and second axes have a smallest mutual spacing D (see marked up drawing) situated at least approximately on a surface which is to be sputter coated of a substrate (see marked up figure as applied to claim 42).

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As shown in Fig.1 rotation of the substrate holder is horizontal with respect to the bottom support surface for the rotating substrate holder (HP plane in drawing as applied to claim 43).

There is a circular erosion ditch 3 caused by the magnetic field generated by the permanent magnet relationship shown in Fig. 1, the radius (r_{Tr}) is about $1/3$ of the length D and is within the range of $1/4 \leq r_{Tr} \leq 2/3$ (as shown in the marked up drawing and applied to claim 46).

The target is substantially rotationally symmetrical about its central axis and has an inherent diameter (ϕT). The diameter of the target and length D are about the same (as applied to claim 47).

The substrate has a diameter (ϕs) and is much smaller than the length D . Therefore with a substrate diameter less than length D , the ratio of $(\phi s)/D$ will be less than 1 (and less than 1.8 as applied to claim 49).

The locus of the smallest mutual spacing is on a plane defined by a surface of the substrate to be coated (see L in marked up figure as applied to claim 50).

The substrate carrier is linearly drivingly displaceable in a direction of the second axis (Fig .1 as applied to claim 56).

The target and substrate face each other and bound a process space on the two sides thereof (yellow highlight Fig. 1 as applied to claim 57).

The differences between the instant claims and JP '568 are that JP '568 does not disclose that the substrate carrier is drivingly rotatable about a second axis (claim 35) or of the diameter of the target being about 1.2 D (claim 48).

With respect to rotating the substrate carrier (claim 35):

Yamanishi employs a rotating substrate holder (see Fig. 2, rotational means 90 and Fig. 7, substrate carrier 17 rotated about its central axis). When employing magnetron sources inclined at an angle relative to the substrate, if the substrate and substrate carrier is made to revolve, the thickness uniformity and quality uniformity of the film formed on the substrate are further improved (col. 7, ll. 20-24 as applied to claims 35 and 58).

The motivation for rotating the substrate about its axis is that the thickness uniformity and quality uniformity of the film formed on the substrate are further improved

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '568 by rotating the substrate carrier and substrate about the carrier axis as taught in the invention of Yamanishi since it would have further improved the uniformity and quality uniformity of the film formed on the substrate.

With respect to the diameter of the target being approx. 1.2 D (claim 48):

JP '568 teaches that the substrate holder 4 can be moved towards and away from the target. As the sputtering target 1 erodes, local erosions spots form in regions

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3. This causes a variance in the sputtering flux from the target onto the substrate. To compensate for this variance, JP '568 moves the substrate along the central axis of the substrate carrier. Doing so varies the distance D (locus of smallest mutual spacing). Upon moving the substrate carrier closer to the target to improve deposition uniformity, distance D will increase, thereby increasing the ratio of the target diameter relative to the distance D. Given that the ratio from the figures teaches of an approximate 1:1 ratio, decreasing the distance D to improve uniformity of the coating on the substrate, will increase the ratio, rendering the approximate ratio of claim 48 a resulting relationship relative to the change in distance D for improving the substrate coating.

The motivation for decreasing the distance D between the target and substrate is to enhance the deposition profile. By doing so, the ratio of the target diameter (a static value) relative to the distance D will increase from about 1 and render an approximate value of 1.2 an obvious result.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '568 by decreasing the distance D since it would have compensated for the variance in sputtering from the local erosions formed on the target. This would have resulted in an increase in the ratio of the target diameter relative to the distance D. Optimizing this distance would have rendered an approximate value of 1.2 an obvious result.

Response to Arguments

18. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Applicant's response does not provide any arguments to the rejection of JP '568. Only 2 statements are made to this rejection, both of which are found on page 9 of the amendment. The first statement is to the rejection made (first paragraph of page 9). The second is a generic statement that JP '568 fails to anticipate or suggest the subject matter of amended independent claims 35 and 58. There is no additional reasoned statement(s) as to why JP '568 fails to suggest the subject matter of amended claim 35. Absent arguments, the rejection stands.

Claim Rejections - 35 USC § 103

19. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '568 in view of JP 10-121237-A (JP '237).

The teachings of claim 35, with respect to JP '568 have been discussed above and are incorporated herein.

The differences not yet discussed are of the size relationship between the target and substrate (claims 51 and 52).

JP '237 discloses of a target to substrate arrangement wherein the target size relative to the substrate size is slightly larger. Thus the ratio of the target sputtering surface to the substrate surface is at least 1.

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The motivation for providing a target diameter which is slightly larger than the substrate diameter is that it ensures full coverage of the substrate during deposition.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '568 by selecting the target diameter to be slightly larger than the substrate diameter since it would have ensured full coverage of the substrate during deposition.

Response to Arguments

20. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

21. Claims 58 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent No. 4,756,810 (Lamont) in view of U.S. patent No. 5,885,428 (Kogan).

Lamont discloses a sputtering method comprising introducing a substrate 58 into a sputtering chamber 10 (Fig. 1), rotating the substrate (workpiece) about a first central axis of the substrate (Fig. 1 and col. 6, ll. 26-36) providing a single magnetron sputtering source 36 with a sputtering surface having second central axis which is oblique to the first central axis of the substrate and magnetron sputter coating the substrate by the source (Fig. 1 as applied to claim 58).

The substrate is a semiconductor wafer (abstract as applied to claim 59).

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The difference between claim 58 and Lamont is that Lamont does not disclose that the wafer has a diameter of at least 160mm.

Note that the instant application appreciated substrate diameters from 50-400 mm. There is no apparent criticality to the substrate wafer size of 160mm or more. Additionally the size of the wafer is generally selected according to the manufacturing process.

Lamont is drawn to semiconductor manufacturing processes. Therein a semiconductor wafer is processed accordingly.

Substrate sizes have increased in the semiconductor industry from 150 mm to 200 mm and 300 mm (Kogan, col. 1, ll. 10-15 and 32-62). The significance of using larger diameter substrates is that it increases the throughput of the apparatus and method since a greater number of semiconductor chips can be manufactured in a single wafer deposition process on a 200mm and further on a 300mm diameter substrate.

The motivation then for selecting the semiconductor substrate to be greater than 150 mm is that it increases the number of discrete semiconductor chips that are manufactured on a single substrate and ultimately increases the throughput of the coating method and apparatus.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lamont by selecting the substrate diameter to be 150 mm or greater since larger diameter sizes are known to provide the benefits of having increased the number of discrete semiconductor chips

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that are manufactured on a single substrate and ultimately will have increased the throughput of the coating method and apparatus.

Response to Arguments

22. Applicant's arguments with respect to claims 58 and 59 have been considered but are moot in view of the new ground(s) of rejection.

It is apparent from the disclosure that the substrate size of 160 mm or greater is not critical to the invention since the instant application teaches that smaller diameter substrates are also processed. The size of the substrate is relative to the manufacturing process and selection of the substrate relative to such would have been obvious.

Conclusion

23. With respect to the limitations of the substrate diameter and the number of sputtering sources. The instant application discloses that substrate diameters from 50mm-400mm are suitable substrate diameters. Thus there is no apparent criticality to substrate diameters of 160mm as recited in claims 35 and 58. In addition, the instant application appreciated both single sputtering sources in a chamber as well as multiple sputtering sources in the chamber. Thus the number of sputtering sources is not critical. It would appear then that these amendments fail to constitute patentable subject matter and are not held to place the claims in condition for allowance.

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24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gregg Cantelmo
Patent Examiner
Art Unit 1745

gc

October 19, 2003

